Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-2. (Canceled)

3. (Currently Amended) ~~The device according to claim 2~~ A device to filter electrical signals, having a number of input terminals arranged spatially at a distance from one another to supply respective pluralities of input signal samples, and a device output terminal to supply a plurality of filtered signal samples, the device comprising:

a number of signal processing channels, each signal processing channel being formed by a neuro-fuzzy filter to receive a respective plurality of input signal samples and to generate a respective plurality of reconstructed samples;

an adder unit to receive said plurality of reconstructed samples and having an output terminal to supply said plurality of filtered signal samples; and

routing means coupled to said output terminal of said adder unit and controllable so as first to supply said filtered signal samples back to said signal processing channels, then to supply said filtered signal samples to said device output terminal, wherein each signal processing channel includes:

a sample input terminal to receive alternately said input signal samples and said filtered signal samples and to supply signal samples ~~of signal~~ to be filtered;

a signal feature computing unit to receive a respective plurality of samples to be filtered and to generate signal features;

a neuro-fuzzy network to receive said signal features and to generate reconstruction weights; and

a signal reconstruction unit to receive said samples to be filtered and said reconstruction weights and to generate said reconstructed samples from said samples to be filtered and said reconstruction weights.

4. (Original) The device according to claim 3 wherein said signal feature computing unit generates, for each said sample to be filtered:

a first signal feature correlated with a position of a sample to be filtered within an operative sample window;

a second signal feature correlated to a difference between said sample to be filtered and a central sample within said operative sample window; and

a third signal feature correlated to a difference between said sample to be filtered and an average sample value within said operative sample window.

5. (Currently Amended) The device according to claim ~~1~~3, further comprising a current-weights memory connected to said neuro-fuzzy filters and to store filter weights.

6. (Original) The device according to claim 5, further comprising a weight training unit to calculate in real time said filtering weights.

7. (Original) The device according to claim 6 wherein said weight training unit comprises:

a training signal supply unit to supply a training signal having a known noise component;

a weight supply unit to supply training weights;

a spatial filtering unit to receive said training signal and said training weights and to output a filtered training signal;

a processing unit to process said training signal and said filtered training signal and to generate a fitness value; and

a control unit to repeatedly control said weight training unit and repeatedly receive said fitness value, said control unit being coupled to store the training weights having best fitness value in said current-weights memory.

8. (Original) The device according to claim 7 wherein said training signal supply unit includes a noise sample memory to store a plurality of noise samples, and a number of adders, one for each input of said device, each adder being coupled to receive a respective plurality of input signal samples and said noise samples, and to output a respective plurality of training signals.

9. (Currently Amended) The device according to claim 8, further comprising a switching unit having a number of changeover switch elements, one for each signal processing channel, each changeover switch element having a first input terminal coupled ~~connected~~ to a respective input terminal of the device, a second input terminal coupled ~~connected~~ to ~~the~~ an output terminal of a respective adder, and an output terminal coupled ~~connected~~ to a respective signal processing channel.

10. (Original) The device according to claim 7 wherein said weight supply unit comprises a random number generator.

11. (Currently Amended) The device according to claim 8 wherein said processing unit comprises means for computing a fitness degree correlated to ~~the~~ a signal-to-noise ratio between said filtered training signal and said noise samples.

12. (Original) The device according to claim 7, further comprising a best-fitness memory to store a best-fitness value and a best-weights value, wherein said control unit comprises comparison means for comparing said fitness value supplied by said processing unit and said best-fitness value, and writing means for writing said best-fitness memory with said fitness value, and said best-weight memory with corresponding training weights, in case said fitness value supplied by said processing unit is better than said best-fitness value.

13. (Original) The device according to claim 5, further comprising an acoustic scenario change recognition unit to receive said filtered signal samples.

14. (Original) The device according to claim 13 wherein said acoustic scenario change recognition unit includes:

a subband–splitting block to receive said filtered signal samples from said device output and to generate a plurality of sets of samples;

a features extraction unit to calculate features of each set of samples;

a neuro-fuzzy network to generate acoustically weighted samples; and

a scenario change decision unit to receive said acoustically weighted samples and to output an activation signal for activation of said weight training unit.

15. (Original) The device according to claim 14 wherein said subband splitting block includes a plurality of splitting stages in cascade.

16. (Original) The device according to claim 15 wherein each said splitting stage includes:

a first and a second filter, in quadrature to each other, to receive a stream of samples to be split and to generate each a respective stream of split samples; and

a first and a second downsampler unit, each to receive a respective said stream of split samples.

17. (Original) The device according to claim 16 wherein said first filter of said splitting stages is a lowpass filter, and said second filter of said splitting stages is a highpass filter.

18. (Original) The device according to claim 14 wherein said feature extraction unit calculates energy of each set of samples.

19. (Original) The device according to claim 14 wherein said neuro-fuzzy network comprises:

fuzzification neurons to receive said signal features, and to generate first-layer outputs that define a confidence level of said signal features with respect to membership functions of a triangular type;

fuzzy AND neurons to receive said first-layer outputs and to generate second-layer outputs derived from fuzzy rules; and

a defuzzification neuron to receive said second-layer outputs and to generate an acoustically weighted sample for each of said filtered samples, using a gravity-of-gravity criterion.

20. (Original) The device according to claim 14 wherein said scenario change decision unit generates said activation signal by digitization at least one of said acoustically weighted samples.

21. (Currently Amended) The device according to claim 19, further comprising:

a clustering training network having a first input terminal to receive said filtered signal samples from said device output terminal, a second input terminal to receive said acoustically weighted samples, and an output terminal connected to the clustering weights memory, said clustering training network including:

energy calculation means for calculating ~~the~~ a mean energy of said filtered signal samples in a preset operative window;

gravity-of-gravity calculating means for determining centers of gravity of said membership functions according to said mean energy, said gravity-of-gravity calculating means being ~~connected~~ coupled and supplying said centers of gravity to said fuzzification neurons;

random generator means for randomly generating weights for said second-layer and third-layer neurons;

fitness calculation means for calculating a fitness function from said filtered signal samples and target signal samples;

fitness comparison means for comparing said calculated fitness function with a previous stored value;

storage means for storing said fitness function, said centers of gravity and said weights, in case said calculated fitness function is better than said previous stored value; and

next-activation means for activating said energy calculation means, said gravity-of-gravity calculation means, said random generator means, said fitness comparison means, and said storage means.

22-23. (Canceled)

24. (Currently Amended) A method for filtering electrical signals, comprising:

receiving a plurality of streams of signal samples to be filtered; and

generating a plurality of filtered signal samples, wherein said generating includes:

receiving alternately said signal samples to be filtered and feedback filtered signal samples, and supplying these signal samples for filtering;

obtaining signal features for the supplied signal samples;

filtering the supplied signal samples ~~each stream of signal samples to be filtered~~ through a respective neuro-fuzzy filter that use the obtained signal features to generate reconstruction weights;

generating a plurality of streams of reconstructed samples based on the reconstruction weights; and

adding said plurality of streams of reconstructed samples to obtain added signal samples.

25. (Original) The method according to claim 24, further comprising:

supplying said added signal samples to said neuro-fuzzy filters; and

repeating said filtering and adding to obtain said filtered signal samples and to output said filtered signal samples.

26. (Original) The method according to claim 24, further comprising weight training including:

supplying a training signal having a known noise component;

supplying filtering weights to said neuro-fuzzy filters;

filtering said signal samples to be filtered, to obtain a training filtered signal;

calculating a current fitness value from said training filtered signal samples;

comparing said fitness value with a previous fitness value; and

storing said fitness value and said filtering weights if said current fitness value is better than said previous fitness value.

27. (Currently Amended) The method according to claim 26 wherein said supplying filtering weights comprises randomly generating said filtering weights.

28. (Original) The method according to claim 27 wherein said randomly generating said filtering weights, filtering, calculating a current fitness value, comparing, and storing are repeated a preset number of times.

29. (Original) The method according to claim 26 wherein said supplying a training signal comprises adding a plurality of noise samples to said filtered signal samples.

30. (Currently Amended) The method according to claim 26, further comprising recognizing acoustic scenario changes in said filtered signal samples and activating said training ~~step~~.

31. (Currently Amended) The method according to claim 30 wherein said recognizing comprises:

splitting said filtered signal samples into a plurality of subbands;

filtering said subbands through clustering neuro-fuzzy filters to obtain an acoustically weighted signal; and

activating said training ~~step~~ if said acoustically weighted signal has a preset value.

32. (Original) The method according to claim 31 wherein said splitting includes filtering said subbands using filters having a pass band correlated to bands that are critical for a human ear.

33. (Currently Amended) The method according to claim 30, further comprising clustering training including:

calculating ~~the~~ a mean energy of said filtered signal samples in a preset operative window;

determining centers of gravity of membership functions of said clustering neuro-fuzzy filters according to said mean energy;

calculating a fitness function from said filtered signal samples and target signal samples;

comparing said fitness function with a previous stored value; and

storing said fitness function and said centers of gravity, should said calculated fitness function be better than said previous stored value.

34. (Currently Amended) A system for filtering electrical signals, the system comprising:

~~a~~ means for receiving a plurality of streams of signal samples to be filtered; and

~~a~~ means for generating a plurality of filtered signal samples, including:

means for receiving alternately said signal samples to be filtered and feedback filtered signal samples, and for supplying these signal samples for filtering;

means for obtaining signal features for the supplied signal samples;

~~a~~ means for filtering ~~each stream of signal samples to be filtered~~the supplied signal samples through a respective neuro-fuzzy network that use the obtained signal features to generate reconstruction weights;

means for generating a plurality of streams of reconstructed samples based on the reconstruction weights; and

~~a~~ means for adding said plurality of streams of reconstructed samples to obtain added signal samples.

35. (Currently Amended) The system of claim 34, further comprising ~~a~~ means for updating filter weights used by the neuro-fuzzy network.

36. (Currently Amended) The system of claim 34, further comprising ~~a~~ means for detecting changes in an acoustic scenario.

37. (Currently Amended) The system of claim 36, further comprising ~~a~~ means for training the means for detecting changes in the acoustic scenario.

38. (Previously Presented) The method of claim 24 wherein the plurality of streams of signal samples to be filtered are derived from signals received by a plurality of sensors arranged symmetrically relative to a source of the signals.

39. (New) The device according to claim 3 wherein the reconstructed samples generated by the signal reconstruction unit are calculated using equations:

$$oL(i) = \frac{\sum_{j=0}^{2N} oL3L(i-j) \cdot eL(i-j)}{\sum_{j=0}^{2N} eL(i-j)} \text{ and}$$

$$oR(i) = \frac{\sum_{j=0}^{2N} oL3R(i-j) \cdot eR(i-j)}{\sum_{j=0}^{2N} eR(i-j)}, \text{ wherein:}$$

oL(i), oR(i) are the reconstructed samples;

oL3L(i), oL3R(i) are the reconstruction weights;

eL(i), eR(i) are the samples to be filtered; and

N is a position of a central sample in a work window.

40. (New) A device to filter electrical signals, having a number of input terminals arranged spatially at a distance from one another to supply respective pluralities of input signal samples, and a device output terminal to supply a plurality of filtered signal samples, the device comprising:

a number of signal processing channels, each signal processing channel being formed by a neuro-fuzzy filter to receive a respective plurality of input signal samples and to generate a respective plurality of reconstructed samples;

an adder unit to receive said plurality of reconstructed samples and having an output terminal to supply said plurality of filtered signal samples; and

at least one routing device coupled to said output terminal of said adder unit and controllable so as first to supply said filtered signal samples back to said signal processing channels, then to supply said filtered signal samples to said device output terminal, wherein each signal processing channel includes a signal feature computing unit to receive a respective plurality of samples to be filtered and to generate signal features, wherein the signal feature computing unit generates for each of said samples to be filtered:

a first signal feature correlated with a position of a sample to be filtered within an operative sample window;

a second signal feature correlated to a difference between said sample to be filtered and a central sample within said operative sample window; and

a third signal feature correlated to a difference between said sample to be filtered and an average sample value within said operative sample window.

41. (New) The device according to claim 40, further comprising a signal reconstruction unit in each of the signal processing channels to receive said samples to be filtered and to receive reconstruction weights, and to generate said reconstructed samples from said samples to be filtered and said reconstruction weights, wherein the reconstructed samples generated by the signal reconstruction unit are calculated using equations:

$$oL(i) = \frac{\sum_{j=0}^{2N} oL3L(i-j) \cdot eL(i-j)}{\sum_{j=0}^{2N} eL(i-j)} \text{ and}$$

$$oR(i) = \frac{\sum_{j=0}^{2N} oL3R(i-j) \cdot eR(i-j)}{\sum_{j=0}^{2N} eR(i-j)} \text{, wherein:}$$

oL(i), oR(i) are the reconstructed samples;

oL3L(i), oL3R(i) are the reconstruction weights;

eL(i), eR(i) are the samples to be filtered; and

N is a position of the central sample in the operative sample window.